GUTRIDE SAFIER LLP
ADAM J. GUTRIDE (State Bar No. 181446)
SETH A. SAFIER (State Bar No. 197427)
KRISTEN G. SIMPLICIO (State Bar No. 263291)
100 Pine Street, Suite 1250
San Francisco, California 94111
Telephone: (415) 639-9090
Facsimile: (415) 449-6469

TYCKO & ZAVAREEI LLP
HASSAN A. ZAVAREEI (State Bar No. 181547)
JEFFREY D. KALIEL (State Bar No. 238293)
2000 L Street, N.W., Suite 808
Washington, DC 20036
Telephone: (202) 973-0900
Facsimile: (202) 973-0950

Attorneys for Plaintiff, SCOTT KOLLER

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO

SCOTT KOLLER, an individual, on behalf of himself, the general public and those similarly situated, Plaintiff, v. MED FOODS, INC., AND DEOLEO USA, INC. Defendants.	CASE NO. 3:14-CV-2400-RS DECLARATION OF RODNEY J. MAILER, PHD, IN SUPPORT OF PLAINTIFF'S MOTION FOR CLASS CERTIFICATION Date: December 3, 2015 Time: 1:30 p.m. Ctrm. 3, 17th Floor Hon. Judge Richard Seeborg

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I, **RODNEY J. MAILER, PhD**, submit the following declaration and report in accordance with the California Rules of Civil Procedure.

I. INTRODUCTION

1. I have been engaged by Gutride Safier LLP and Tycko & Zavareei LLP on behalf of Plaintiff Scott Koller, as an expert in the fields of oil chemistry and quality, particularly as they relate to environment, cultivation, storage and handling of olive oil.

2. A defendant in this case is Deoleo USA, Inc., a subsidiary of Deoleo S.A. I understand that Deoleo S.A. bottles olive oil at its facilities in Spain and Italy, under the "Bertolli" brand, which Deoleo USA imports into the United States for sale. I am familiar with this brand, which is sold in many countries around the world.

3. My services are compensated at the rate of $380 per hour.

II. QUALIFICATIONS

4. I headed the edible oil research program for the New South Wales, Australia Department of Primary Industries ("NSW DPI") until 2012. NSW DPI is an agency of the state government of New South Wales, which oversees agriculture, fisheries, food, water, and other natural resources. I joined this organisation in 1979. Since then, I managed research projects in various oil crops, particularly canola and olive oil. Currently, I am a visiting scientist with the NSW Department of Agriculture and an adjunct professor of the E H Graham Centre, a subsidiary of the Charles Sturt University, a public university in Wagga Wagga and other cities in New South Wales.

5. I have supervised numerous projects on issues related to edible oils over many years, and I work with several groups including the Australian Oilseed Federation ("AOF") and the Australian Olive Association ("AOA"). Examples of these projects include the evaluation of new methods to determine adulteration in olive oil and gathering more evidence on the value of diacylglycerol and pyropheophytin to determine olive oil freshness.

6. My field of expertise is oil chemistry, specifically oil quality in relation to environment, cultivation, storage and handling. I have carried out many research studies on various oil producing crops including olives, the results of which have been published in peer-

reviewed journals.

7. I am the Australian representative on the International Standards Organisation for Fats and Oils and past President of the International Society for Fat Research ("ISF"), Germany.

8. I have represented the NSW DPI as a technical advisor to the AOF. I am an honorary member of the AOF and the AOA. I am a Research Fellow of the Swedish Academy of Agriculture and Forestry and a Fellow of the American Oil Chemists' Society ("AOCS").

9. I have an MSc. from Australian National University, Canberra, Australia and a PhD from the University of Manitoba, Winnipeg, Canada, in Plant Science.

10. A more detailed description of my research interests, education, background, achievements and publications is provided in my Curriculum Vitae ("CV"), attached to this report as Exhibit 1.

11. As described in my CV, my professional research projects and initiatives have included:

a. Harvest timing to improve oil quality and sensory characteristics in olive oil;

b. Shelf life and oxidative stability in oil;

c. Storage and transport of olive oil; and

d. Developing an Australian sensory panel network for olive oil.

12. I have carried out many research studies on various oil-producing crops including olive oil, the results of which have been published in peer reviewed journals. Recent projects in which I have been involved, which are relevant to this report, include those listed below and published at the site of the Rural Industries Research and Development Corporation ("RIRDC") www.rirdc.gov.au:

a. Olive Oil Yield, Quality and Cultivar Identification, Robards, K, and Mailer, RJ. 2001. RIRDC Project, UCS-19A.

b. Olive Harvest – Harvest timing for optimal olive oil quality, Mailer R. J., Conlan, D. and Ayton, J. 2005. RIRDC Pub. No. 05/013

c. Establishment of an olive oil sensory panel, Mailer, R.J. 2005. Horticulture Australia Limited.

d. A Survey of Australian Olive Cultivars to Determine Compliance With International Standards, Mailer, R.J. and Ayton, J. 2008. RIRDC.

e. The Natural Chemistry of Australian Extra Virgin Olive Oil, Mailer, R.J. 2007. (Chinese, Spanish and Eng. Translation) Copyright RIRDC. Book 2007-04-19.

f. Effect of Storage Containers on Olive Oil Quality, Mailer, R.J. and Graham, K. 2009. RIRDC.

g. Harvest timing, sensory analysis and shelf life for optimal olive oil quality, Mailer, R.J. and Ayton, J. 2009. RIRDC Publication No. 10/177/ ISBN 978-1-74254-1440.

h. The effect of storage in collapsible containers on olive oil quality, Mailer, R.J. Graham, K. and Ayton, J. 2009. RIRDC Publication No. 12/008. ISBN 978-1-74254-363-5.

i. Report: Tests Indicate That Imported 'Extra Virgin' Olive Oil Often Fails International and USDA Standards, Frankel, E.N., Mailer, R.J, et al. 2010 Robert Mondavi Institute for Wine and Food Science, University of California, Davis.

j. The effect of storage containers on extra virgin olive oil quality, Ayton, J., Mailer, R.J., and Graham, K. 2012. RIRDC. ISBN 978-1-74254-379-6.

k. Tilahun Zeleke, K, Mailer, R et al. 2012. Oil content and fruit quality of nine olive (Olea europaea L.) varieties affected by irrigation and harvest times, New Zealand Journal of Crop and Horticultural Science. Vol. 40, No. 4.

13. I have tested and evaluated thousands of samples of olive oil in my career.

14. I have previously testified in two other U.S. litigation matters regarding olive oil: *Mostofi v. Discount Drugs Wisconsin, Inc. T/A Rodmans,* and related cases (District of Columbia case numbers 2011 CA 000161B, -163B, -367B, -369B, and -977B), and *Kumar v Safeway*, Alameda County Superior Court Case No. RG14726707. I have not previously testified in any other oil-related litigations. A complete list of cases where I have provided testimony in the past four years is provided in Exhibit 1.

III. ASSIGNMENT

15. I have been asked to perform analysis and express opinions regarding (a) the chemical and sensory properties of Defendant's Bertolli brand extra virgin olive oils and (b) the processing, transportation, storage, handling, display, and sale of Defendant's Bertolli brand extra virgin olive oils.

16. My expertise qualifies me to do the type of analysis required in this case. Of particular relevance is my involvement in professional research projects and initiatives including harvest timing to improve quality and sensory characteristics in olive oil. I have additionally conducted focused research into shelf life, oxidative stability, storage and transport of olive oil. Finally, I have been involved in developing an Australian testing facility and sensory panel network for olive oil testing and analysis.

IV. MATERIALS REVIEWED

17. In my study of this matter, I have had access to the materials as set forth in Exhibit 2. I have considered and relied on these materials to varying degrees. Citations to these materials that appear below are meant to be exemplary but not exhaustive. I have also extensively relied on my professional knowledge and experience.

18. I understand that certain aspects of discovery in this case have not been completed. For example, there are items that have not been produced or reviewed by me. As a result, my analysis here is only preliminary and may require revision and/or supplementation.

19. Accordingly, my investigation and review in this matter is continuing, and this report represents my findings based on my review of information available as of the date of this report. My review of the information now in my possession is continuing. Additional information may become available which would further support or modify the conclusions that I have reached to date. Further, I reserve the right to consider and comment on any additional expert statements and testimony provided by other experts in this matter. Any changes or necessary amplification of these conclusions will be addressed in supplemental reports or testimony, which I reserve the right to provide. I also reserve the right to rely on demonstrative exhibits to supplement my testimony at trial.

V. EXHIBITS

20. Exhibit 1 is my Curriculum Vitae.

21. Exhibit 2 lists the materials reviewed, considered or made available to me by counsel.

22. Exhibits 3a through 3e are true and correct copy of test results that were performed by the IOC-accredited laboratory and sensory panel at the NSW DPI Wagga Wagga Agricultural Institute ("WWAI"), on Defendant's olive oil and other oils, in 2014 and 2015.[1]

23. Exhibit 4 is a true and correct copy of the UC Davis "Report: Tests Indicate That Imported 'Extra Virgin' Olive Oil Often Fails International and USDA Standards," July 2010, of which I was one of the authors.

24. Exhibit 5 is a bibliography of the studies and publications cited in this declaration (other than the studies I authored or co-authored, which are listed in paragraph 12).

25. Exhibit 6 is an exemplar of a profile sheet for a sensory (organoleptic) test of virgin olive oil under the IOC standards.

VI. OPINIONS AND BASES THEREFORE

A. Summary of Opinions

26. Based on my general knowledge of the olive oil industry, research studies that I have carried out over several years on oil quality, my background in oil chemistry, and my review, thus far, of the materials, and testimony in the case, it is my opinion that Defendant's Bertolli brand extra virgin olive oil is mislabeled, and Defendant has not followed the procedures and taken the precautions necessary to ensure that the oil is extra virgin at time of sale or through the expected date of use.

B. Definitions of Olive Oil Grades And Testing Standards

27. Olive oils are defined by standards that are established by government agencies (for example, the U.S. Department of Agriculture ("USDA") or the California legislature), by international organisations of which countries are members (such as the International Olive

[1] The redacted portions of Exhibit 3 set forth test results for olive oil from other manufacturers, distributors and/or retailers.

Council ("IOC")), and sometimes by private industry groups.

28. There are some differences among the various standards regarding the categories for oil grades. However, most countries base their standards on those of the IOC. The IOC has a United Nations charter to develop criteria for olive oil quality and purity standards.

29. Olive oil can be divided into three broad categories: "virgin," "refined," and "pomace." "Virgin" oils are produced solely by mechanically extracting oil from the olives. Historically, oil was extracted by pressing the olives, but today, the extraction process typically involves milling the olives into a paste, then spinning the paste in a centrifuge to extract the oil.

30. "Refined" oils involve additional steps including refining, bleaching and deodorizing (RBD). Refining has various processes including removal of free fatty acids by the addition of caustic soda (sodium hydroxide) to the oil, which forms a soap and then is filtered out. Bleaching means removing color from the oil. Deodorizing traditionally has meant heating the oil to high temperatures and injecting steam, which causes volatile compounds to be forced out of the oil. More recently, it has become increasingly common to deodorize olive oil by heating it to lower temperatures under vacuum. In the balance of this declaration, unless otherwise specified, I use the term "refined oil" to include oil that has been through one or more of the RBD processes.

31. "Pomace oil" is made by taking olive pomace—i.e., the olive paste after the virgin oil has been mechanically extracted, and extracting additional oil with organic solvents. Pomace oil is then subjected to further refining (RBD).

32. Each of these three general categories of olive oil also has subcategories. Based on the IOC standard, within the "virgin" category, there is "extra virgin," "virgin," "ordinary (virgin)" and "lampante." "Lampante" is oil that is not fit for human consumption (and which was historically used for lamp oil). Lampante must be refined before it is fit for human consumption. Within the "refined" category there are further subcategories, including "refined olive oil," and "olive oil," some of which include blends of refined and virgin oils. Within the "pomace" category, there are also subcategories, including "crude olive-pomace oil," "refined olive-pomace oil," and "olive pomace oil."

33. There are three key chemical tests that are used to determine if virgin (i.e.,

mechanically extracted) oil qualifies as "extra virgin," "virgin," "ordinary (virgin)," or "lampante" under IOC standards. These tests generally measure the following:

a. **Free fatty acids**. Free fatty acid relates to the condition of the fruit at the time of milling. Olives contain endogenous lipase enzymes, which hydrolyse triacylglycerides (oil molecules) to release free fatty acids (hydrolysis). In intact fruit, the enzymes are isolated from the triacylglycerides. If the fruit is damaged prior to harvesting (frost, pests, disease) or stored for extended periods before processing, the enzymes react with the triacylglycerols, causing the production of free fatty acids (Pristouri, et al., 2010). Results are usually expressed as a percentage (%) of the oil as oleic acid, because that is the predominant fatty acid in olive oil. The higher the free fatty acids, the greater the indication of poor quality fruit such as damaged, overripe, insect infestation, overheating during production or too much of a delay between harvest and crush. The free fatty acids limit for extra virgin oil is ≤0.8%, or 0.8 grams per 100 grams of oil. The free fatty acid limit for virgin oil is ≤2.0%, or 2 grams per 100. The free fatty acid limit for ordinary (virgin) oil and lampante oil is ≤3.3%, or 3.3 grams per 100.

b. **Peroxide value**: Unsaturated free fatty acids in oil react with oxygen (i.e., they oxidise) to form peroxides. This oxidation occurs during oil extraction and processing and can continue after bottling and during storage. The peroxides further react to form by-products such as aldehydes, ketones, hydrocarbons, alcohols and esters. These volatile compounds are responsible for the defective flavours (Pristouri et al., 2010). High quality extra virgin olive oils have a peroxide value of less than 10meq/kg. In order to qualify as extra virgin, virgin, or ordinary (virgin) under IOC standards, olive oil must have a peroxide value of less than 20 meq/kg. There is no limit on peroxide value in lampante oil.

c. **Ultraviolet absorption**. Fatty acids absorb light at particular wavelengths in the UV region. A spectrophotometric test is used to measure this absorption, and the results can be used to determine changes in olive oil. Relative to other chemical

tests, this is a good test to indicate if an oil has been modified chemically or physically, such as bleaching or deodorizing, especially in oils that have been heated. The UV test can also indicate whether oil has been blended with refined olive oil or refined olive-pomace oil. Two wave length regions are utilized, 232nm and 268nm. Under IOC standards, extra virgin oil has UV absorbency of less than or equal to 0.22 at 268nm and less than or equal to 2.50 at 232nm. Virgin oil has a UV absorbency of less than or equal to 0.25 at 268nm and less than or equal to 2.60 at 232nm. Ordinary virgin oil has a UV absorbency of less than or equal to 0.30 at 268nm. There are no limits for UV absorbency of lampante oil because it is not edible.[2]

34. In addition to oil chemistry, the IOC utilizes a protocol for sensory testing, also known as organoleptic testing, which includes, but is not limited to, perception, sensation and sensitivity. Virgin olive oil, which is one of the few edible oils that is mechanically extracted and not refined prior to consumption (unlike, for example, canola oil and other seed oils, which are generally refined), retains many volatile and phenolic compounds, which are responsible for the oils' typical flavor and aroma.

35. Under IOC standards, trained tasting panels are able to assess the oils to determine the levels of positive attributes, such as fruitiness, bitterness and pungency. Positive attributes bitterness and pungency are associated with and caused by the presence of phenolic compounds. (Kiritsakis, 1998). Phenolics are powerful antioxidants, which not only contribute to shelf life stability of olive oil (Mailer, et al., 2005) but also are believed to be responsible for the health

[2] Extra virgin oil, virgin oil, and ordinary (virgin) oil all must meet various additional IOC standards, which are identical for all three grades of oil. These standards relate to moisture and volatile matter (%m/m), insoluble impurities in light petroleum (%m/m), trace metals of iron and copper (mg/kg), volatile fatty acid composition, percentage of trans fatty acids, fatty acid profile, sterol and triterpene dialcohol composition, desmethylsterol composition (as a percentage of total sterols), total sterol content (in mg/kg), erythrodiol and uvaol content (as a percentage of total sterols), wax content, maximum difference between the actual and theoretical ECN 42 triacylglycerol content, stigmastadiene content (mg/kg), content of 2-glyceryl monopalmitate, unsaponifiable matter (g/kg), phenols content, and content of specific sterols (campestoerol, stigmasterol, and delta-7-stigmastenol). Lampante oil must meet some but not all of these standards. A detailed description of the IOC chemical and sensory testing standard is available at http://www.internationaloliveoil.org/estaticos/view/222-standards.

benefits associated with a diet that includes olive oil. In addition to the antioxidant (anti-aging) effect, the presence of phenols in olive oil has been linked to a reduction in inflammation, blood glucose, insulin, and blood pressure. (Moreno-Luna, et al. 2012; Farnetti, et al., 2011; Covas, et al. 2006; Salvini et al., 2006; Fito, et al. 2005; Ferrara, et al. 2000; Madigan, et al. 2000). Phenolics identified in olive oil belong to a number of different classes and inhibit oxygen by a variety of mechanisms based on radical scavenging, hydrogen atom transfer and metal-chelating attributes. (Krichene, et al., 2010). Phenolic content is greater in immature olives and decreases as the fruit ripens or becomes over-ripe. (Mailer, et al., 2002).

36. Sensory testing panels also assess negative attributes (also known as "defects") arising due to poor quality fruit, incorrect processing or issues arising during storage. The possible "defects" on which the oil is judged are "fusty/muddy sediment," "musty/humid/earthy," "winey/vinegary acid/sour," "frostbitten olives (wet wood)," "rancid," and "other negative attributes."

37. Sensory panels are periodically tested (and re-tested) and accredited by the IOC or other relevant bodies such as AOCS. Panels are qualified only if their results match those of other panels around the world, and if the variation of opinions among panel members falls within an appropriate standard deviation. (The full set of the accreditation requirements can be viewed at www.internationaloliveoil.org/documents/viewfile/4330-panels1 and http://www.internationaloliveoil.org/estaticos/view/226-laboratories-panels.)

38. The IOC further specifies a strict methodology for the organoleptic testing, including standardization of the number and qualifications of the testers, colour and size of glass used to hold the olive oil, the temperature of the room and oil sample, quantity of oil in the glass, and testing technique—e.g., how to pick up and hold the glass, how to swirl the oil in the tester's mouth, and how to breathe when testing.

39. During the sensory testing, each panelist separately marks on a profile sheet his or her analysis about each of the positive attributes and defects, by making a cross-hatch on a 10 cm-long horizontal line. (If the attribute is not found, no cross-hatch is made.) An exemplar of a profile sheet is attached as Exhibit 6. After the sensory test, a clerk measures the distance from

the left side of the horizontal line to the cross-hatch, and the value is recorded. For example, if a tester makes a cross-hatch at 0.5 cm along the "fruity" line, that tester has given a score of 0.5 in fruitiness.

40. Under IOC sensory standards, grades of virgin oil are assessed based on the "median of the fruity attribute" and the "median of defects." The "median of the fruity attribute" means the median of the values assigned by all panel members. Thus, in the above example where one tester gave a score of 0.5, if the panel had nine members, and four assigned scores above 0.5 and the other four below 0.5, the median would be 0.5. The median is not to be confused with the mean. If four panelists gave a score of 0.0, and five gave a score of 0.5, the median would be 0.5.

41. The "median of the defects" is determined by looking at the median scores for each of the five defects and then taking the highest of those scores. As an example, if nine panelists make the following marks on the "rancid" line: 1.5, 1.9, 2.5, 2.7, 3.0, 3.0, 3.3, 3.8, 4.7, the "median" of the defect "rancid" would be 3.0. If the nine panelists make the following marks on the "fusty/muddy sediments" line: 5.2, 4.8, 4.3, 4.0, 3.5, 3.5, 3.2, 2.9, 2.5, the median of the defect "fusty/muddy sediments" would be 3.5. Assuming no other defects were found, the total "median of the defects" in this example would be 3.5, as that is the highest of the five median scores. The scores 3.0 and 3.5 are *not* added to reach a combined median of defects.

42. Because of the use of medians, in order for any particular defect to get a score greater than zero, at least half the sensory panel members must think the oil has *that particular defect.* In other words, if four of nine panel members think that the oil has a particular defect, such as "fusty/muddy sediment," but the other five do not, then the oil will be said *not* to have that defect. Even if the remaining five panel members think there is some other defect—for example, three panelists think the oil is "musty/humid/earthy" and the other two think it is "rancid"—the oil will obtain a "median" score for each defect of zero if no five panel members agree on the *same* defect. In this case, the "median of the defects" will be zero, even though everyone in the panel thought that the oil was defective in some way. Because the testing is done by each panel member separately, in the same room (divided by room dividers) at the same time,

panel members do not have the opportunity to change their analysis based on analysis of other panel members.

43. Under IOC sensory standards, olive oil may be labeled "extra virgin" if it has a "median of the fruity attribute" greater than zero, and a "median of defects" (as defined above) equal to zero. Thus, if four panelists think the oil has no fruitiness, and the other five think it has 0.1 (out of 10) of fruitiness, the oil will have a "median of fruitiness" greater than zero, and pass the standard. Similarly, even if everyone on the panel finds a defect (or two defects), the oil can have a "median of defects" equal to zero, as long as no single defect garnered a vote from at least half the panel.

44. If oil does not meet the "extra virgin" standard because the median of defects is greater than zero, it still passes the IOC sensory tests for "virgin" olive oil if it has a median of defects of no more than 3.5. As noted above, because the median of defects scores are not added across the five defects, oil will pass the test as long as the panel median does not exceed 3.5 on any single defect.

45. Oil that does not meet the "virgin" standard may pass the IOC sensory tests for "ordinary (virgin)" oil if it has either of the following: (a) a median of fruitiness greater than zero and a median of defects of greater than 3.5 and no more than 6.0 (on any single defect); or (b) a median of fruitiness equal to zero and a median of defects of greater than 0 and no more than 3.5 (on any single defect).

46. Oil that does not meet these sensory standards is deemed "lampante"—i.e., not fit for human consumption.

47. The United States is not a member of the IOC but has adopted similar standards. In October of 2011, the United States Department of Agriculture ("USDA") adopted olive oil standards, a revision of those that had been in place since 1948. In May 2012, the USDA followed up the publication of its new standards with a detailed voluntary program of compliance, a Grading Manual for Olive Oil and Olive-Pomace Oil. The manual defines the standardized process for inspection, testing and authentication and provides a path for authentication and USDA certification through voluntary laboratory testing.

48. With regard to the chemical and sensory characteristics discussed in the text above, the USDA and IOC standards for "extra virgin" olive oil are identical. The standards for "virgin" oil are also identical, except that the limit on median of defects in the USDA standard is 2.5 instead of 3.5 as in the IOC standard. There is no grade of "ordinary (virgin) olive oil" under the USDA standards. Instead, under the USDA standard, when the median of the fruity attribute is zero, or the median of defects is greater than 2.5, the oil is "lampante."

49. The State of California has also adopted its own standards. Those standards mirror the IOC standards, although they do not specifically provide sensory criteria for "virgin" or "ordinary virgin" oil. California also refers to "lampante" oil as "crude" olive oil. Cal. Health & Safety Code §§ 112877(a).

50. The above-described chemical and sensory testing methodology and procedures for the IOC standards are equally applicable to the USDA and State of California standards.

C. Additional Testing Methodologies

51. In addition to the chemical tests described above, there are numerous other chemical tests that can be performed on olive oil to assess its composition. For example, a fatty acid profile test can help determine if the oil has been adulterated with seed oil. There are also tests to measure total phenolic content, and tests to measure the presence of α-tocopherol (also known as Vitamin E), a naturally occurring anti-oxidant that is synthesized by plants and is an important dietary nutrient for humans. Tocopherols are fat soluble antioxidants valued for their ability to inhibit oxidation in food. The tocopherol content of food increases storage life by protecting food lipids from autoxidation. (Kamal-Eldin and Appelqvist, 1996). There is no standard limit for polyphenols or tocopherols.

52. There are two other very important tests that should be used to measure the quality of olive oil. Although these tests have not yet been incorporated into the standards adopted by the IOC, USDA, or California legislature, they have been incorporated into standards adopted by the California Department of Food and Agriculture (with respect to oils produced in California), and

Standards Australia (with respect to oils sold in Australia), AS 5264-2011, Table 5.[3] These tests also have been incorporated into privately adopted standards, including those of the Lidl chain of more than 10,000 supermarkets in Europe. These tests measure the following:

a. **DAGs**. Diaclyglycerols ("DAGs") are formed when a fatty acid is hydrolysed from a triacylglycerol (oil) molecule. In oil freshly made from olives of good quality, more than 90% of the DAGs will be in the 1,2 form where the fatty acids are bonded to a glycerol molecule in the 1 and 2 positions. However, the bond on the 2 position is weak and easily broken, leading to the migration of that 2 position fatty acid to the 3 position, resulting in the 1,3 DAG. (Fronimaki et al., 2002). The migration from 1,2 to 1,3 DAGs takes place naturally as the oil ages. (Mailer and Ayton, 2008). Warmer storage temperatures (i.e. storage conditions) and higher free fatty acid levels (i.e. poor handling of olives before milling) will both accelerate this process. DAGs are not affected by the short exposure to high heat that is characteristic of deodorizing. Because of these principles, the ratio of 1,2 DAGs to the total DAGs is a good indicator of the quality of the olive fruit, the processing, and the age and storage conditions of an oil. If the oil is from high quality fruit, milled and bottled promptly, and kept in proper storage conditions (to be further explained below), the proportion of DAGs in the 1,2 form will decrease at a constant rate from around 94% to around 35% over approximately a 22 to 28-month period. If the fruit is of poor quality, or not promptly processed (meaning that there are higher free fatty acids), or not stored properly, the percentage of DAGs will decrease more quickly. For olive oil produced in California, the California Department of Food and Agriculture has adopted a standard that 1,2 DAGs comprise a minimum of 35% of total DAGs for olive oil to be labeled extra virgin. The same minimum of 35% has been adopted by the Standards Australia for oil sold in Australia, with the further provision that the percentage of 1,2 DAGs

[3] Standards Australia is Australia's peak non-government standards organisation. It is charged by the Australian Government to meet Australia's need for contemporary, internationally aligned standards and related services.

must exceed the minimum through the "best by" date on the bottle. The Lidl chain tests all oil obtained from its suppliers to ensure that the 1,2 DAGs are above 50% for all oil labeled extra virgin.

b. **PPPs.** Pyropheophytins ("PPPs") are by-products of chlorophyll formed when the pigment structures change as a result of heating or aging. Chlorophyll converts to pheophytin and ultimately to pyropheophytins. Because the degradation of chlorophylls to PPPs occurs at a predictable pace if oil is kept in proper storage conditions, it is possible to gain information about the age of an olive oil by measuring the proportion of PPP-a to the total pheophytins. The rate at which the degradation occurs can be accelerated by even short periods of high temperatures such as those utilized during the deodorizing process, which also makes it a useful indicator of the presence of deodorized olive oil. (Boskou, et al., 2006; Mailer and Ayton, 2008). In properly stored oil, PPP-a as a proportion of pheopytins will be near zero at time of bottling, and will reach 17% by 24 to 33 months after bottling. PPP levels do not differ based on free fatty acids, so they are a useful cross-check to the DAG test on the age of the oil and the effects of heating. For olive oil produced in California, the California Department of Food and Agriculture has adopted a standard that PPP-a comprises no more than 17% of total pheopytins for olive oil to be labeled extra virgin. The same maximum of 17% has been adopted by Standards Australia for oil sold in Australia, with the further provision that the percentage may not exceed the maximum through the "best by" date on the bottle. The Lidl chain tests all olive oil obtained from its suppliers to guarantee PPP-a below 10% for all oil labeled extra virgin.

D. Proper Harvest, Milling, Storage and Handling of Olives and Olive Oil

53. The first step in ensuring that olive oil is extra virgin starts with the olives themselves. As noted above, olives must be harvested before they become overripe, as the beneficial phenolic compounds are highest when the olives are green but quickly decrease as the fruit mature. And, as also noted above, the olives must also be milled quickly after harvesting,

rather than being allowed to sit on the ground where they can be bruised or damaged and where the enzymes in the olives can react with the triacylglycerols and cause the production of free fatty acids (FFA). High FFA results in the formation of peroxides and ultimately sensory defects such as rancidity.

54. Olive growers who use proper harvesting methods will harvest olives before they become overripe, often with large motorized harvesters that transfer the olives directly into a truck. The olives are then driven to a mill, where the oil is extracted and placed into controlled storage on the same day. This process ensures minimal increase in free fatty acid content. Unfortunately, in countries such as Spain, Turkey and Tunisia it is common to see growers using improper, antiquated methods. With these methods, olives are allowed to ripen and fall from the trees onto the ground, where they deteriorate. Eventually, they are transferred into a truck (along with insects, dirt, leaves, and other debris) and transported to the mill (Beaufoy, 2001). By the time such olives are milled, they have already begun to ferment.

55. Even after the oil is extracted from the milled olives, there are many more important steps in the handling of olive oil to ensure its quality. Olive oil is a perishable product, like any fresh juice or food. Over time, it degrades naturally—extra virgin oil will become virgin oil; virgin oil will become ordinary (virgin) oil; and ordinary (virgin) oil will become lampante oil. Even in the most optimal conditions, which will be discussed below, high-grade extra virgin olive oil will cease to meet the standards for extra virgin oil approximately 24-36 months after the olives are harvested. That lifespan is dramatically shortened if the olive oil is improperly stored or handled. Much research, including most recently a three-year Australian study that I was involved in, confirms that exposure to oxygen, light and/or heat, even for a short period of time, will cause extra virgin olive oil to degrade quickly, negatively affecting both the chemical and sensory profile of the oil. Exposure to light causes a substantial loss of antioxidants, especially tocopherols, and a significant increase in rancidity.

56. I below discuss the specific chemical and organoleptic effects of exposure to temperature and light and oxygen on the quality and longevity of olive oil.

1. Temperature

57. Storage temperature of olive oil has a significant effect on the chemical profile of olive oil, including a negative effect on peroxide value, K_{268} UV absorption, pyropheophytin-a, 1,2-diacylglycerols, polyphenols, and α- tocopherols.

58. As discussed above, oxidation, and the formation of peroxides, begins during oil extraction and processing and continues after bottling and during storage. Storage temperature has a significant effect on the peroxide value of all oil. There will be a decrease of the peroxide value of all oils as time progresses, and the decrease is more rapid in oils stored at higher temperatures. The level of secondary oxidation products can be measured with the K_{268} UV absorption test (Bilancia et al., 2007).

59. When olive oil is stored between 15°C and 22°C (59°F to 72°F) there will be little change in K_{268} value over an extended period of time—e.g., 36 months. However, if oil is stored at or above 22°C (72°F), K_{268} value will increase quickly and significantly during storage. This expedited increase in the absorption at 268nm can be explained by the accelerated transformation of the peroxides already formed into other products such as aldehydes and ketones. (Allouche, et al., 2007).

60. Pyropheophytin-a also increases immediately and at a significant rate upon exposure to higher storage temperatures. In my opinion, pyropheophytin-a increase is a clear indicator of unsatisfactory storage conditions or exposure to high temperature. Based on my studies, olive oil will almost invariably exceed the standard limit for pyropheophytin-a after only three months when stored at 37°C (99°F). Moreover, pyropheophytin-a levels in olive oil that is stored at higher temperatures will increased at a much greater rate than those at lower temperatures, with the oils stored at the higher temperatures (up to 37°C (99°F)) exceeding the limits much faster than oil stored at lower temperatures. (Mailer and Ayton, 2008.)

61. Higher temperature also leads to significant negative changes in polyphenols, α – tocopherols and colour.

62. As a result of these changes described above, storage temperature ultimately affects the organoleptic or sensory profile of olive oils. The sensory profile of oils stored at 15°C

(59°F) will change only slightly during the storage period, with many oils maintaining the extra virgin status for up to 36 months under optimal conditions. This is supported by data from the above-discussed chemical analysis which showed, generally, that oils stored at 15°C (59°F) showed little change in polyphenol content over 36 months, as well as the measure of secondary oxidation products, K_{268}, also remaining relatively stable. For oil that is stored at 22°C (72°F), rancidity will occur between 18 and 36 months after extraction. For oil stored at 37°C (99°F), rancidity occurs between 6 and 18 months. The rancidity at this high temperature increased significantly during the storage period, with some of the oils reaching the lampante classification after 36 months of storage, meaning the oil is inedible unless refined. (Ayton, J. et al., 2012)

63. In sum, oil that is stored above 15°C (59°F) will show changes, with degradation becoming more rapid as temperature increases. Moreover, the positive attributes of fruitiness, bitterness and pungency will decline. These results are confirmed by the chemical analysis with the secondary oxidation products measured by K_{268} increasing in these oils, while the polyphenol content decreased at the same time.

2. Light

64. Light will also cause degradation of olive oil. The negative effect of light on olive oil is particularly acute when the olive oil is stored in clear, non-UV protective bottles.

65. Like heat, light has a significant negative effect of the sensory profile of EVOO. It also has significant effect on the following chemical measurements: peroxide value, K_{268}, pyropheophytin a, α –tocopherols and chlorophyll.

66. Exposure to light has a significant effect on the UV absorbance at 268nm (K_{268}). This is due to the catalytic effect of light, which propagates oxidation in olive oil and degrades the fatty acids.

67. The measurement of pyropheophytin-a is negatively effected by light. In olive oil that is exposed to light, pyropheophytin-a quickly disappears. This is due to a complete breakdown of chlorophylls, and all of its derivatives, when oil is exposed to light. Thus, the reduction of detectable amounts of pigments, including pyropheophytin-a, is a good indicator of the improper storage of oil (exposed to light). The PPP test is also useful in tandem with the

measurement of K_{268} to indicate the exposure of oil to light. If pyropheophytin-a and the other compounds (pheophytins) usually seen in chromatograms from this analysis are absent, and the K_{268} value is high, it is very likely that at some point the oil was exposed to light.

68. Exposure to light also has a significant effect on the α-tocopherol content of the oils. Exposure to light will cause α-tocopherol to decline rapidly.

69. Exposure to light has a significant effect on the sensory profile of olive oil—particularly on the negative attribute, rancidity. Light may increase the rate of rancidity in some oils, and positive attributes (e.g., fruitiness, bitterness and pungency) may decrease more quickly in the oils exposed to light than those in the dark. These results are mainly due to the secondary oxidation products, which are typically present in olive oil that is exposed to light. These products impart unpleasant flavours and aromas.

70. My research into the negative effects of light exposure of the chemical and sensory properties of olive oil is consistent with a 2007 study by researchers at the National Agricultural Research Foundation, Institute of Technology of Agricultural Products, Greece and the Higher Technical Educational School, Department of Food Science, Thermi, Thessaloniki, Greece (the "Greek Study") (Vekiari, et al., 2007). The Greek Study concluded that olive oil exposed to light had significantly lower tocopherol, carotenoid and chlorophyll contents than did the same oils kept in the dark. Overall, the results obtained in the Greek Study showed that the shelf life of the oils exposed to light is shorter than that of oils kept in the dark, and that after only two months of exposure to light, the oils examined could no longer be considered as "extra virgin." I agree with this conclusion.

3. Oxygen

71. Olive oil sensory properties are also quickly and significantly degraded when the oil is exposed to oxygen. In short, olive oil that is exposed to oxygen will quickly become rancid.

72. Exposure to oxygen also has a significant negative effect on peroxide value, K_{232}, K_{268}, pyropheophytin-a, polyphenols, α –tocopherols, chlorophyll and fatty acid profile.

73. Oil exposed to oxygen will show a drastic increase in the peroxide value. In my study, extra virgin olive oil exposed to oxygen exceeded the IOC peroxide limit after between

nine and 18 months.

74. Exposure to oxygen has a significant effect on the UV absorbance K_{232} in olive oil, because K_{232} is a measure of the primary oxidation products in olive oil. Therefore this test closely resembles the accumulation of peroxides in oil when exposed to oxygen. Based on my study, olive oil that was exposed to oxygen exceeded the IOC limit (≤2.50) for UV absorption at K_{232} within three to 12 months.

75. UV absorbance at 268nm (K_{268}) was also significantly affected by exposure to oxygen in the oils. In my research, oil that was exposed to oxygen exceeded the Australian and IOC limit of ≤0.22 after 20 to 27 months. This is very similar to the conclusions of other authors (Krichene, et al., 2010).

76. Generally, olive oil that is exposed to oxygen will have a higher pyropheophytin-a content than oil that is kept in airtight containers. These results are likely due to the action of free radicals on the pigment compounds present in the oil. Polyphenols and α-tocopherols act as antioxidants by reacting with free radicals to help prevent oxidation of the oil. After a period of oxygen exposure, the antioxidants will react with oxygen in the open bottles. Therefore the protective effect from these compounds on the pigments will not be as strong, and the formation of pyropheophytin-a continues at a slightly higher rate than those not exposed to oxygen, similar to the findings of Anniva et al., (2006). In my research, I have found that the rate of increase was significantly different between those oils exposed to oxygen and those in closed bottles.

77. Exposure to oxygen also has a significant effect on the total polyphenol content of the oils. While the polyphenol content will decrease over time in oil not exposed to oxygen, if olive oil is exposed to oxygen, decrease over time is much greater.

78. Oxygen exposure will also have a significant effect on the α-tocopherol content of the oils. The α-tocopherols will decrease slowly in olive oil that is not exposed to oxygen. However, when exposed to oxygen, the oils decrease more rapidly. This understanding is very similar to that of other researchers. (Krichene, et al., 2010).

79. Exposure to oxygen has a significant effect on the sensory quality of olive oil. Oils exposed to oxygen will show signs of rancidity earlier than those in closed bottles. In general, the

positive attributes of fruitiness, bitterness and pungency will also decrease at a fast rate and to a large degree. As oils oxidise, hydroperoxides are formed which further decompose into secondary oxidation products. It is these secondary oxidation products that are mainly responsible for the rancid attribute that is characteristic of degraded oil. These compounds, which produce the undesirable characteristics, include aldehydes, ketones, alcohols, hydrocarbons and esters.

80. In conclusion, although the shelf life of extra virgin olive oil is dependent on a number of factors, a fundamental prerequisite for quality and longevity are proper storage and handling of the oil. It is my opinion that extra virgin olive oil must be properly stored and handled to maintain its classification of extra virginity for even a few months. Care must be given such that olive oil, particularly extra virgin oil, is stored at or below 22ºC (72°F), in dark, airtight containers. Exposure to higher temperatures and light must be minimized to reduce degeneration of the oil.

81. To maximize longevity, extra virgin olive oil should be bottled in opaque glass to avoid sunlight and fluorescent lights. It should additionally be shipped and stored in airtight containers and temperature controlled environments. Failure to control for any one of these factors, for any extended period of time, will compromise the shelf life and quality of the extra virgin oil.

E. Chemical and Organoleptic Testing of Bertolli Olive Oil

82. The WWAI operates an olive oil testing service. I established the original WWAI laboratory in 2001 while I was WWAI's Principal Research Scientist. I am familiar with the procedures of the WWAI testing service. The WWAI service is based on the latest technology and requirements of the IOC. The WWAI laboratory also provides all testing required in determining if olive oil meets the Australian Standard AS5264-2011.

83. The WWAI chemical testing laboratory is accredited by the National Association of Testing Authorities ("NATA") and the IOC. The current period of WWAI IOC Recognition is from the 1st December 2014 until 30th November 2015. The laboratory has maintained IOC recognition for chemical testing in every year since 2001 and for sensory testing in every year since 2004. The WWAI also participates in proficiency tests conducted by international

organisations such as the AOCS and the German Society for Fat Science ("DGF").

84. In addition to chemical testing and analysis, the WWAI includes the Australian Olive Oil Sensory Panel (AOOSP). The AOOSP is also accredited by NATA and the IOC. The AOOSP has been awarded the highest possible score for sensory analysis of olive oil by the IOC. More information regarding the qualifications and formation of the AOOSP is available at http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/87197/pf231-Testing-olive-oil-quality.pdf.

85. On or about March 5, 2014, I arranged for the receipt of ten bottles of olive oil, via Federal Express from Plaintiff's counsel to the WWAI. Included were five bottles of Bertolli extra virgin olive oil. The bottles were the following:

a. Bertolli Extra Virgin Olive Oil, 750 ml, Lot L3439T, with a best by date of March 31, 2015.

b. Bertolli Extra Virgin Olive Oil, 500 ml, Lot L2446R, with a best by date of May 31, 2014.

c. Bertolli Extra Virgin Olive Oil, 750 ml, Lot L3439T, with a best by date of March 31, 2015.

d. Bertolli Extra Virgin Olive Oil, 750 ml, Lot L3151T, with a best by date of June 30, 2015.

e. Bertolli Extra Virgin Olive Oil, 500 ml, Lot L3341R, with a best by date of April 30, 2015.

86. Between March 5 and 31, 2014, at my request, the WWAI performed a number of chemical tests on the olive oils Plaintiff's counsel provided. WWAI chemical tests included the following: 1,2-Diaclyglycerol; Fatty Acids Profile; Fatty Acids Profile Saturation Ratio; Total Pyropheophytin-a; UV Absorption; Free Fatty Acid Content; and Peroxide Value.

87. Between March 11 and 31, 2014, at my direction, the WWAI - AOOSP additionally performed the organoleptic or sensory testing of the same olive oils, according to the Olive Oil Organoleptic Assessment – IOC Document No. 15. (See www.internationaloliveoil.org/documents/viewfile/3685-orga6 for the specific parameters of the

IOC Organoleptic Assessment.)

88. I have reviewed and analyzed WWAI's test results. That review and analysis leads me to conclude that the Bertolli EVOO did not meet the extra virgin standard when tested and/or could not be expected to be extra virgin through the best by date.

89. With regard to chemical testing, one of the Bertolli samples (sample b above) had ultraviolet absorption result of 2.41 at 232nm (close to the limit of 2.50), and it also had a 1,2 diacyglycerols result of 31.3 (below the limit of 35) and a pyropheophtytin-a result of 24.9 (above the limit of 17). The other bottles were within the required limits for the chemical tests, but the results indicated that the oil in most of them was unlikely to pass chemical tests through the represented "best by" date on the bottles, which were between 12 and 15 months after the testing was performed. Samples (a), (c) and (e) had 1,2 diaglycerol results of 37.0, 36.6 and 42.3, respectively, along with pyropheophytin-a results of 11.5, 10.0 and 9.6, respectively, and UV absorption at 232nm of 2.00, 2.41 and 2.04, respectively. Due to the normal degradation of the oil over time as described above, if stored at room temperature for another year, most if not all of these bottles would have been expected to have a 1,2 diaglycerols values below the limit of 35, a pyropheopytin-a value above 17, and/or a UV absorption value at 232 nm above 2.50.

90. The ASOOP's organoleptic or sensory panel testing further concluded that none of the samples qualified as extra virgin. All samples had a median of defects greater than zero and none except sample (e) had median fruitiness greater than zero. The defects and their median scores were as follows:

a. Fusty/muddy sediments (2.95)

b. Fusty/muddy sediments (4.05)

c. Fusty/muddy sediments (3.65), Rancid (1.10)

d. Winey/ Vinegary/ Acid/ Sour (4.05)

e. Rancid (2.00)

f. Fusty/muddy sediments (2.45), Rancid (1.20)

The complete test results are attached as Exhibit 3a under Sample Codes 0001-0005.

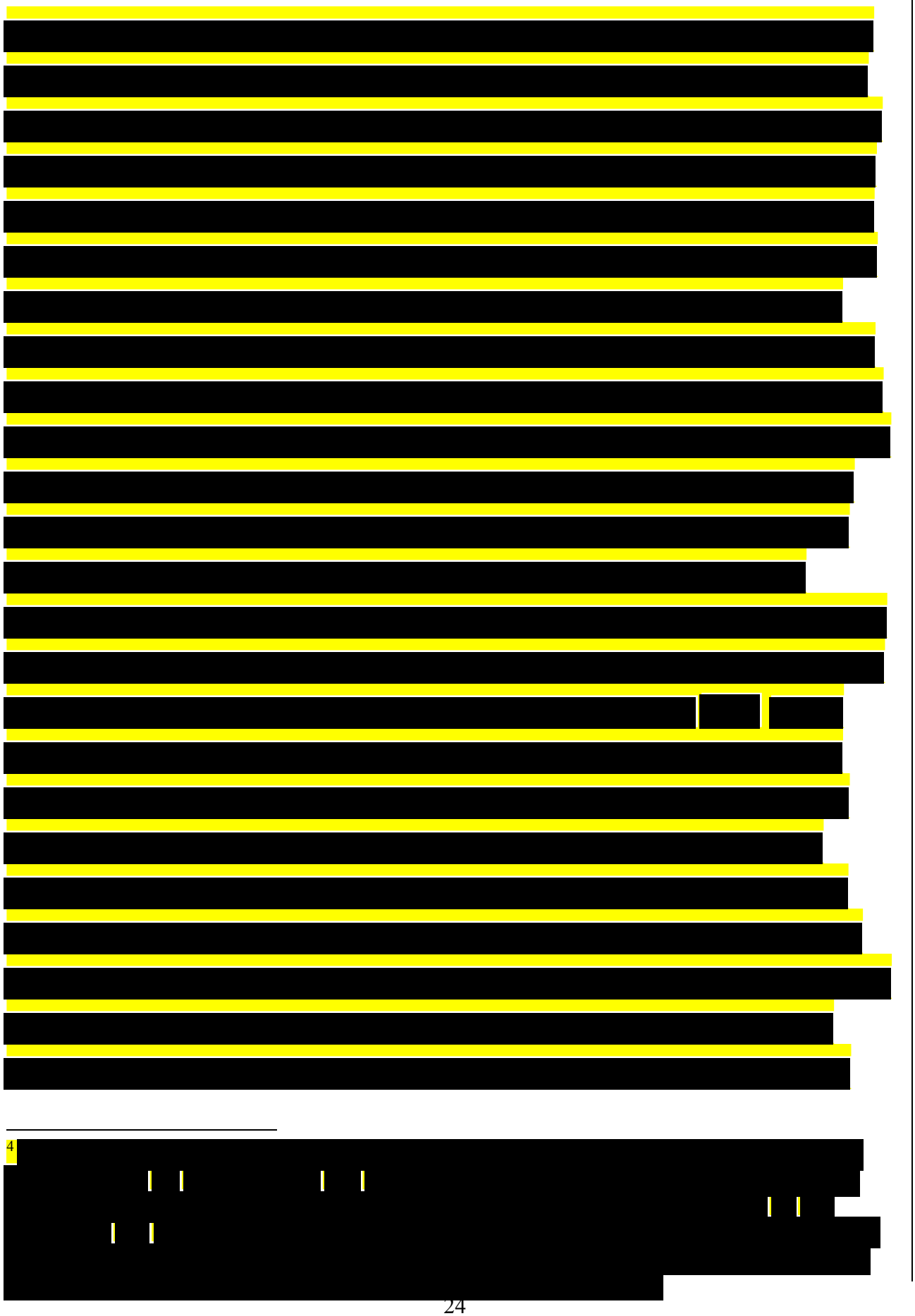
91. I am additionally familiar with other tests of Bertolli olive oils. For example, I was

one of the authors of the report issued by UC Davis entitled "Report: Tests Indicate That Imported 'Extra Virgin' Olive Oil Often Fails International and USDA Standards," July 2010 (attached as Exhibit 4). The UC Davis Sensory Panel, the AOOSP, and the WWAI (which I supervised at the time) evaluated the Bertolli oils based on standards and testing methods established by the IOC.

92. The 2010 report involved testing of three bottles of Bertolli olive oil, which were acquired at retail in Sacramento County, San Francisco and Los Angeles County. Chemical tests were performed at WWAI, showing that the Sacramento and Los Angeles samples had pyropheophytin-a results of 17.8 and 20.8, respectively (both above the limit of 17). Further, the Sacramento and San Francisco samples had 1,2 diacyglycerol results of 38.1 and 39.2, respectively (approaching the limits of 35). Further, the organoleptic testing performed by ASOOP concluded that all three samples were "virgin" rather than extra virgin.

93. In April, 2011, I and the other authors of the 2010 UC Davis report authored a follow-up study, in which we retested certain of the brands tested in the earlier study, using more samples of each brand. The April 2011 Report evaluated 18 samples of Bertolli olive and concluded that 16 of them (or 89%) were in fact not "extra virgin" olive oil, based on testing performed at WWAI, the AOOSP, and the UC Davis Sensory Panel. In chemical analysis, two of the samples (samples 17 and 18) failed the UV absorbance test at K_{232}, with values of 2.58 and 2.57. Those two samples, as well as nine others, for a total of 11 samples (1, 2, 7, 8, 9, 13, 14, 15, 16, 17, and 18) had 1,2 diacyglycerol results below the limit of 35; the same group (other than samples 2 and 9) also had pyropheophytin-a results above the limit of 17. Further, thirteen samples (samples 1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 15, 18) failed both the AOOSP's and the UC Davis Sensory Panel's organoleptic tests for extra virgin oil. Thus the only samples that passed both the chemical and the organoleptic tests were samples 4 and 11. (Frankel, et al., 2010)

94. [redacted]



95. In September 2012, the WWAI was asked to perform additional testing of two bottles of Bertolli brand extra virgin olive oils that I understand were purchased in the Washington D.C. area. I have been advised that these bottles were (a) 500 ml, Lot L2224R, best by December 31, 2013, purchased from Giant, and (b) 750 ml, Lot L2316T, best by October 31, 2013, purchased from Safeway. I have reviewed the results of those tests, which are attached as Exhibit 3b. They show that 1,2 diacyglycerols and pyropheophytin-a tests were not performed at that time. Although the oil fell within limits of the other chemical tests, the UV absorption results of the bottles at K_{232}, were 2.11 and 2.15, respectively, and would be expected to increase as the oil was exposed to light and heat for its remaining shelf life. It would be unreasonable to expect that such oil would pass the chemical tests at the end of the shelf life unless it was preserved in optimal conditions. Further, the organoleptic tests concluded that the samples were "virgin" and "ordinary," respectively, as both had median of defects greater than zero, and the second sample did not have median of fruitiness greater than zero.

96. In October 2012, the WWAI was asked to test additional bottles of Bertolli brands extra virgin olive oil that had been purchased in the area of Washington, D.C. I further have been advised that these samples were: (a) Lot number L1428T, purchased from Mohtaram, (b) Lot number L1425R, purchased from Giant, (c) Lot number L1314R, purchased from Rodman's, (d) and Lot number L1331T, purchased from Safeway. I have reviewed the results of those tests, which are attached as Exhibit 3c. Sample (c) failed the UV absorption test at K_{268}, with a value of 0.25, above the limit of 0.22, which meant that it could at best be classified "virgin"; it also had a result of 2.47 at K_{232}, very near the extra virgin limit of 2.50. Although the other samples passed

the chemical tests for extra virgin oil, they did so only by small margins, and it could not reasonably be expected that they would continue to do so through the best by dates if exposed to heat or light. Samples (a), (b) and (d) had UV absorption results at K_{232} of 2.22, 2.46 and 2.26, respectively, with (b) very close to the limit of 2.50. Samples (b) and (d) also had UV absorption results at K_{268} of 0.19 and 0.21, respectively, close to the limit of 0.22. The organoleptic tests concluded that none of the samples were extra virgin but were at best "virgin" as all had a median of defects greater than zero.

97. In early 2015, the WWAI laboratory was asked to perform additional tests of olive oil purchased in the United States by the National Consumer's League. The WWAI was provided one bottle of Bertolli EVOO, which had Lot number 4125R and bore a best by date of December 31, 2015. The oil passed the chemical tests, but organoleptic tests concluded that the oil was "virgin" under IOC standards because there was a median of defects greater than zero, specifically Fusty/Muddy Sediments (median 2.5). See Exhibit 3d, Sample Code 0009.

98. In the summer of 2015, I was asked by plaintiff's counsel in this litigation to perform additional tests of bottles of olive oil purchased in California. Those bottles were sent via Federal Express from California to WWAI, where they were received on or about August 20, 2015. Among the brands of oil sent for testing were five bottles of Bertolli extra virgin olive oil, as follows:

a. Bertolli EVOO 500ml, Lot L4332R, with best by date of February 29, 2016.

b. Bertolli Organic EVOO 500ml, Lot L5317R, with best by date of October 31, 2016.

c. Bertolli EVOO 500ml, Lot L5117R, with best by date of October 31, 2016.

d. Bertolli EVOO 750ml, Lot L5310R, with best by date of September 30, 2016.

e. Bertolli EVOO 500ml, Lot L5513R, with best by date of September 30, 2016.

99. The oil was tested by WWAI in late August and early September 2015. I have reviewed the test results, of which copies are attached as Exhibit 3e. Sample (a) was within the chemical limits, but its pyropheophytin-a result of 15.6 was approaching the limit of 17. Similarly its UV absorption results of 2.17 at 232nm and 0.17 at K_{268} were not very far from the

respective limits of 2.50 and 0.22. That bottle was unlikely to remain within chemical limits for the six additional months of shelf life represented on the bottle unless maintained at optimum conditions (i.e. below 22°C (72°F) if not colder, in the dark, and sealed without exposure to oxygen). Sample (b) had UV absorption results of 2.35 at K_{232} and 0.16 at K_{268}; it was similarly unlikely to remain within chemical limits for the fourteen remaining months of its shelf life unless maintained at optimum conditions. Sample (c) had a UV absorption result at the limit of 2.50 for K_{232} and would certainly exceed the limit within the remaining fourteen months of its shelf life if exposed to any heat, light or oxygen; indeed it may already have been above that limit due to the limits of reporting. Likewise the 1,2 diacyglycerols result of 35.1 was essentially at the limit of 35. Sample (d) had a 1,2 diacyglycerols result of 37.2, also very near the limit; its UV absorption result of 2.14 at K_{232} would likely increase as well, such that it would not be able to pass the tests for the remaining thirteen months of shelf life. Finally, sample (e) was well above the UV absorption limit at K_{232} with a result of 2.77.

100. Organoleptic tests showed that all samples had median of defects greater than zero, namely: (a) Fusty/Muddy Sediments (2.9), Rancid (0.2); (b) Fusty/Muddy Sediments (3.0), Rancid (3.0); (c) Fusty/Muddy Sediments (3.9), Rancid (3.4); (d) Fusty/Muddy Sediments (3.9), Rancid (4.1); and (e) Fusty/Muddy Sediments (3.5), Rancid (0.7). Only sample (a) had median of fruitiness greater than zero. Thus, sample (a) was "virgin" and the others were "ordinary."[5]

101. [redacted]

[5] In addition to showing degradation of the oil due to improper processing, storage and handling, as further discussed below, the test results also could suggest that some percentage of refined oil was blended in [redacted] Some indications of refined oil may be: low organoleptic testing values for positive attributes (fruitiness, bitterness, pungency), low organoleptic testing values for defects, high UV values, and/or high PPP values. Based on current testing protocols, it is not typically possible to distinguish between extra virgin oil that degraded and extra virgin oil to which a small amount of refined oil was added, but in either case, the oil is not properly labeled as extra virgin.

[redacted]

102. [redacted]

[redacted]

103. [redacted]

[redacted] In my opinion, the fact that the retained sample passes the test does not mean that the oil is properly labeled. Rather, the supplier must take into account real-world conditions that face the oil after bottling to ensure that the label will be accurate at the time of purchase by consumers. Further, the fact that several lots of oil failed the NAOOA testing should have caused Deoleo to engage in a much wider round of testing of oil obtained at retail, as well as a much wider recall of oil in the stream of commerce.

104. [redacted]

[redacted] In my view, this exception to the recall requirements is inappropriate, particularly in the situation where, like here, there are repeated failures of oil obtained from different retail locations in different time periods, because the manufacturer needs to take into account the effect of expected handling conditions on the oil quality in determining how to label its oil. As explained in the next section, Deoleo does not act properly to protect its oil from degradation in the stream of commerce and therefore is not acting appropriately in labeling the oil as extra virgin.

F. Procurement, Bottling, Shipping and Storage of Bertolli Olive Oils

105. Based on my review of testimony by Carlos Jimenez Ot, the Director of Quality, Purchasing and Planning for Deoleo S.A. in Spain, as well as of documents obtained by Deoleo, I have learned that [redacted]

106. I have been provided with a sample of documents obtained from Deoleo, [redacted]

107. I understand that it is common for manufacturers to transport bulk oil by ship in large polyethelene bags. Such bags are typically permeable by oxygen and light, thus making the oil susceptible to accelerated degradation, unless the bags are lined (for example, with aluminum). If bags are not used, but the oil is pumped into a large empty tanker ship (i.e., a tank that is full of air), the oil will oxidize. To prevent such oxidation, air would need first to be removed from the tank, for example, by pumping an inert gas into the tank, before pumping in the

oil. The same process would need to be used when the oil is pumped out of the tanker ship and into tanks on land where it can be blended.

108. The evidence I have reviewed further suggests that [redacted] In the Mediterranean areas, olives are typically harvested between November and February, [redacted] It is not reasonably likely that the oil could have remained extra virgin for this period after harvest. [redacted]

[redacted]

109. Olive oil that is twenty-nine months old is nearing the maximum time to maintain good quality oil even under optimum storage conditions. This process will ensure significant decrease in phenolic antioxidants. Further, if this is a continuous process, and new oil is regularly "blended" with old oil, I am not sure how [redacted]. Rather, the blends may contain traces of older oil. The process of blending old oil and new also will cause the new oil to degrade more quickly, because the peroxide radicals in the old oil will cause more rapid formation of peroxides in the new oil.

110. [redacted] Those tests [redacted] determine whether the oil already had aged or been damaged by poor handling or adulterated. [redacted] Deoleo could not ensure that the oil was recently harvested and properly handled by the suppliers.

111. I also have been advised that the Bertolli extra virgin olive oil was, and for the most part continues to be, packaged in clear glass or clear plastic containers. As discussed above, the use of clear packaging means that the oil will be exposed to light on store shelves, and the fluorescent lighting used in many retail stores is particularly damaging to the quality of olive oil.

112. The use of plastic, formally known as PET (Polyethylene Terephthalate) bottles also raises concerns about exposure to oxygen, regardless of whether the bottles are clear or tinted. PET comes in various grades with different oxygen transmission rates. Even the plastic lid can be the source of significant oxygen penetration. If oxygen can get in contact with the oil through the plastic, there will be an increase in peroxide and UV readings. Initially the UV232 will be high but that diminishes as the UV268 increases. The exposure to oxygen will also lead to

sensory defects.

113. I have been further advised by counsel for Plaintiff that once the oil is bottled and the bottles are placed in cartons, the cartons are shipped, [redacted] from Deoleo's facilities [redacted] to ports in the United States, where they are placed on trucks and taken to warehouses, stored, and then taken by truck to retail stores (or to additional warehouses, from where they are trucked to the stores). I have been advised by counsel for Plaintiff that once the cartons reach the retail locations, the cartons may again be stored until the bottles are unpacked and placed on the shelf for customers to purchase. I have reviewed testimony by Carlos Jimenez, in which he admitted [redacted] (Jimenez Ot Tr. at 90:9-91:1.) I am aware of research that shows that temperatures inside a shipping container on a trans-oceanic voyage can be much higher than the recommended 22°C (72°F) maximum for extra virgin olive oil, particularly while the container is being loaded and unloaded in port. (Leinberger, 2006). Based on this research I believe that temperatures inside a truck cargo container can also easily exceed those limits. Mr. Jimenez also admits that [redacted] (Jimenez Ot Tr. at 160:13-161-1.) [redacted]

114. I have been advised by counsel for Plaintiff that [redacted] (Russell Tr.

259-60.) I agree with that testimony. I also have reviewed marketing documents from Deoleo (previously known as Med Foods, Inc.), which [redacted] (DEOLEO046193). As noted above in paragraph 94, I also have seen documents [redacted] Point-of-sale testing is vital in perishable product such as extra virgin olive oil. I also think it is important that Deoleo test samples of different lots, obtained from different retailers in different locations, and that testing occur on a regular basis. [redacted]

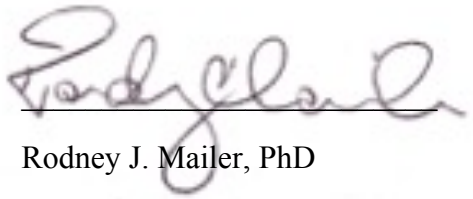
115. Mr. Jimenez testified that [redacted]. (Jimenez Ot. Tr. at 154:14-19.) [redacted] there was and is no reasonable basis for Deoleo to represent that the oil in the bottles is extra virgin at time of sale.

VII. CONCLUSIONS

116. Based on the above, it is my conclusion that the Bertolli Extra Virgin Olive Oil is mislabeled. Deoleo does not take the steps that are reasonably necessary to ensure that the product in the bottles is extra virgin at time of sale and will remain extra virgin through the time of purchase or use. Indeed, the product will rarely be extra virgin through the "best by" date on the bottles, because of, among other things, the poor quality of the oil placed in the bottle, the lack of temperature controls during shipping and storage, and the use of clear bottles that fail to protect from light degradation. The testing results indicate oil that has been poorly stored and handled. Not only have the majority of Bertolli EVOO bottles that I tested during the last five years failed to qualify as extra virgin, but the evidence I have reviewed shows that Bertolli is purchasing old oil from its suppliers, using clear sand permeable containers that will cause it to degrade, and failing to implement controls necessary to preserve it as extra virgin.

Executed this 30th day of October, 2015, at Lambton, New South Wales, Australia. I

declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.



Rodney J. Mailer, PhD